Please amend Claim 7 as follows:

A1 Cont

7. (Amended) The invention of Claim 6 wherein said means correcting color dispersion in said output wavefront includes first and second counter-rotating optical wedges.

Please amend Claim 9 as follows:

A2

9. (Amended) The invention of Claim 8 further including an imaging lens in optical alignment with said mirror.

REMARKS

Claims 1 - 14 are presently pending. In the above-identified Office Action, Claims 7 to 9 were rejected under 35 U.S.C. §112 (second paragraph). Claims 1 - 4, 8, 13 and 14 were rejected under 35 U.S.C. § 102(b) as being anticipated by Grinberg *et al.* Claims 5-7 were also rejected under 35 U.S.C. § 103 (a) as being unpatentable over Grinberg *et al.* in view of Inoue, Kramer and Budd *et al.*

By this Amendment, Applicants have amended Claims 5, 6, 7 and 9 and thereby addressed the objections to Claims 7 - 10. For the reasons set forth more fully below, Applicant respectfully submits that the subject application properly presents Claims patentable over the prior art. Accordingly, reconsideration, allowance and passage to issue are respectfully requested.

The inventive beam steering system and method of the subject application addresses the need in the art for small, compact optical scanning system with small aperture size requirements, wide field-of-regard and minimal color dispersion characteristics. The invention provides a means for optical beam steering over a broad spectral band and over

a wide field-of-regard in a small, compact optical scanning system with small aperture size requirements, wide field-of-regard and minimal color dispersion characteristics.

The inventive system includes a novel device for receiving an input wavefront of electromagnetic energy along a first axis and for refracting the input wavefront as an output wavefront along a second axis. The device is a unique form of a liquid crystal array which can be electrically manipulated to change the effective **refractive** index of each pixel. The index of refraction of the device varies in response to an applied voltage. The voltage is supplied by a microprocessor and/or a servo-control system. By changing the index, the incident phase front can be steered at an angle with respect to the first axis and otherwise manipulated according to the index variant pattern induced in the array. Accordingly, the output beam is steered in response to the applied voltage.

In the illustrative implementation, the device is an array of liquid crystal devices. Counter-rotating optical wedges are provided for restoring color balance to the output wavefront. In the illustrative embodiment, a mirror is included for compensating the wavefront output by said first and second counter-rotating optical wedges. The wavefront reflected by the mirror may be output by an imaging lens or other suitable device.

In accordance with the present teachings, beam steering is accomplished through a refractive variation not a diffractive one. This allows the spectral bandwidth to be much broader than for a diffractively manipulated phase wavefront.

The invention is set forth in Claims of varying scope of which Claim 1 is illustrative. Claim 1 reads as follows:

> 1. A system for steering a beam of electromagnetic energy comprising:
>
> first means for receiving an input wavefront of electromagnetic energy along a first axis, said first means including means for **refracting** said input wavefront as an output wavefront along a second axis at an angle with respect to said first axis in response to an applied voltage;
>
> second means for providing said voltage in response to a control signal; and
>
> third means for providing said control signal. (Emphasis added.)

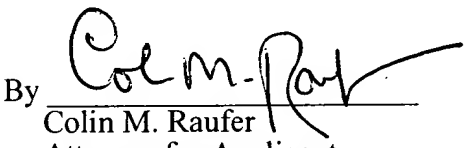
None of the references, including those cited but not applied, teaches, discloses or suggests the invention is presently claimed. That is, none of the references teaches,

discloses or suggests a system or method for steering a beam of electromagnetic energy comprising a mechanism for receiving an input wavefront of electromagnetic energy along a first axis including means for **refracting** the wavefront as an output wavefront along a second axis.

In the above-identified Office Action, the Examiner cited Grinberg and suggested that Grinberg's phased array scanner anticipated the inventions of Claims 1 - 4, 8, 13, and 14. Grinberg endeavors to teach a phased array for optical beam control, however, Grinberg's phased array is **reflective**, not **refractive**. Hence, the invention of Claims 1, 11, 13 and 14, and Claims dependent thereon, are not anticipated by the disclosure of Grinberg.

The references cited but not applied have been carefully considered. None of the references, taken alone or in combination, teaches, discloses or suggests the invention as presently claimed. Accordingly, reconsideration, allowance and passage to issue are respectfully requested.

Respectfully submitted,
J. S. Anderson *et al.*

By 
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 5 has been amended as follows:

5. (Amended) The invention of Claim 1 further including means ~~for restoring color balance to~~ correcting color dispersion in said output wavefront.

Claim 6 has been amended as follows:

6. (Amended) The invention of Claim 5 wherein said means ~~for restoring color balance to~~ correcting color dispersion in said output wavefront includes at least one optical wedge.

Claim 7 has been amended as follows:

7. (Amended) The invention of Claim 6 wherein said means ~~for restoring color balance to~~ correcting color dispersion in said output wavefront includes first and second counter-rotating optical wedges.

Claim 9 has been amended as follows:

9. (Amended) The invention of Claim 8 further including an imaging lens in optical alignment with said mirror.